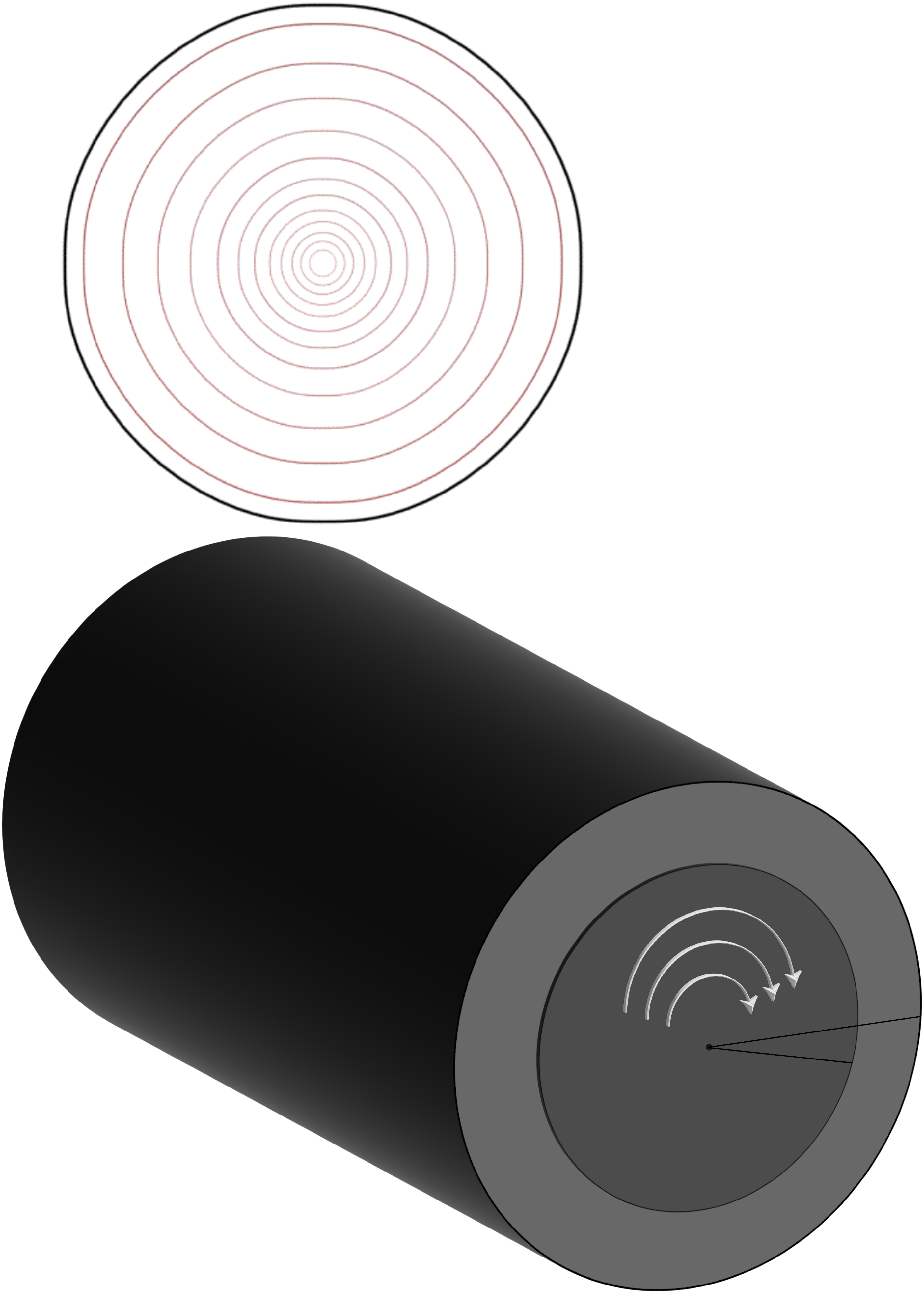

Some lines of magnetic flux exist inside a conductor. Filaments on the surface of a conductor are not linked by internal flux, and the flux linking a filament near the surface is less than the flux linking a filament in the interior. The alternating flux induces higher voltages acting on the interior filaments than are induced on filaments near the surface of the conductor. By Lenz's law the induced voltage opposes the changes of current producing it, and the higher induced voltages acting on the inner filaments cause the higher current density in filaments nearer the surface, and therefore higher effective resistance results. Even at power system frequencies, skin effect is a significant factor in large conductors

Other explanation

Consider conductor is divided into annular filaments like the image, When there AC current there will a alternating flux which link more with inner filament than with outer filament which causes, Inner segment of conductor to have more inductance, and this inductance decreases progressively as we move from center. Which means higher impedance in center so less current in center and current increases progressively as we move from center. This is called skin effect i.ie current is only flowing in surface or skin of the conductor.

Effect of skin effect

Conductor cross-section is not fully utilized, So reduce in cross section increases resistance.

$$R = \frac{\rho\, l}{a}$$

Skin effect depends on

- Increases with diameter of wire
- Shape of wire (Stranded conductors has less skin effect than solid conductors)
- Increase in frequency increases skin effect. More rate of change more inductance.

Skin effect is negligible for frequency < $50Hz$ and diameter < 1Cm.